



**Prevalence and Factors Associated with H Pylori Infection among Symptomatic Patients Attending Songwe Regional Referral Hospital: A Retrospective study.**

Juma Ramadhani<sup>1</sup>, Mariam Gaitan<sup>2</sup>, Florence F. Mdodi<sup>4</sup>, Stephano F. Martine<sup>2</sup>.

<sup>1</sup> Department of Pediatrics and Child Health, Songwe Regional Referral Hospital, P.O. Box 301, Songwe, Tanzania,

<sup>2</sup> Department of Internal Medicine, Songwe Regional Referral Hospital, P.O. Box 301, Songwe, Tanzania,

<sup>3</sup> Department of Pharmacy, Songwe Regional Referral Hospital, P.O. Box 301, Songwe, Tanzania,

<sup>4</sup> Department of Social Welfare, Songwe Regional Referral Hospital, P.O. Box 301, Songwe, Tanzania.

\*Corresponding Author: Email: jumaramadhani25@gmail.com

Conflict of interest: This research was done for the purpose of improving the quality of patient care at Songwe Regional Referral Hospital.

**ABSTRACT**

**Background:** *H pylori* is very common gastrointestinal (GIT) infection affecting about half of the world's population and it is more prevalent in developing countries. This study provides the magnitude of *H pylori* infection among patients attending Songwe Regional Referral Hospital.

**Methods:** A Hospital based retrospective cross - sectional study involved 314 patients who presented with GIT symptoms and were tested for H pylori infection using the stool antigen test at Songwe Regional Referral Hospital from April to May 2023. Patient's socio-demographic and clinical characteristics were obtained from patient files from Hospital records. Statistical data analysis was performed using STATA version 15.

**Results:** The median age of participants was 36 [23 - 53] and the main part, 215 (65.5%) were females. Majority of the study population 212 (88.8%) were residents of Mbozi district. The prevalence of H *pylori* infection was found to be 118/314 (37.6%). No significant difference was observed among patients socio-demographic and clinical characteristics in association with H *pylori* infection.

**Conclusion:** H *pylori* infection is common among patients attending Songwe Regional Referral Hospital; hence clinicians should raise their index of suspicion regarding the infection. However, prospective studies are needed to determine factors associated with H *pylori* infection in order to ensure proper management of patients with H *pylori* infection.

## INTRODUCTION

H *pylori* infection affects more than half of the world's population, however its prevalence varies widely in relation to geographical and socio demographic factors. The prevalence of H *pylori* infection is reported to be higher in developing countries reaching up to more than 70% in Africa whereas it ranges between 25% and 40% in the developed World (1,2).

H *pylori* infection is not a disease on itself however it is a causal causative factor of chronic gastritis which may lead into persistent inflammation of gastric mucosa resulting into Peptic ulcer disease (PUD), gastric adenocarcinoma and Mucosa associated lymphoid Tissue (MALT) Lymphoma (3,4). The main symptom of H *pylori* infection is dyspepsia which may be presented by epigastric pain, early satiety, nausea, vomiting or heartburn (5). H *pylori* is mainly transmitted by fecal oral

route via contaminated water and food (6,7) . Poor hygiene standards, lack of proper sanitation, simple and overcrowded living conditions, infected family members and drinking unsafe water have been associated with *H. pylori* infection (8–10). Other factors include low education level, regular smoking, alcohol drinking, overweight, obesity and high meat consumption (10–12).

Studies in East Africa have shown high prevalence of *H pylori* infection ranging from 35.7% in Uganda, 54.8% and 73.3% among adults and children respectively in Kenya (13,14). Likewise, in Tanzania *H pylori* infection has been found to be common with prevalence of 39.1% among symptomatic adults in Mwanza and 11.5% among children in Kilimanjaro (7,15).

*H pylori* has been declared as class I carcinogen by International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO) and studies have shown *H. pylori* infected persons have a 1 to 2% lifetime risk of developing gastric cancer (10,13,16). Poor management of this infection may contribute to occurrence of cancers and other complications including peptic ulcer.

Despite being common, the burden and factors associated with *H pylori* infection are not well studied especially in southern highlands Tanzania which may lead to low index of suspicion among clinicians regarding the infection. This may hinder early detection and timely management of these patients which in turn may increases morbidity and mortality. Hence, this study aimed at determining prevalence and factors associated with *H pylori* infection among patients attending at tertiary Hospital, Tanzania southern highlands.

## **METHODS**

### **Study design, duration and study area**

This was a retrospective cross sectional study conducted from April to May 2023 at Songwe regional referral Hospital (SRRH) to investigate the burden of *H pylori* infection. SRRH serves a

population of about 1.4 million from Songwe region in Tanzania southern highlands and neighboring countries of Malawi and Zambia.

### **Study population and Eligibility criteria**

All symptomatic patients who were tested for *H pylori* infection using stool antigen test (SAT) during the study period were enrolled and included in the final analysis. Patients who were tested within four (4) weeks since the last *H pylori* eradication therapy and those on Proton pump Inhibitors (PPI) were excluded from the study.

### **Sample size estimation and sampling technique**

314 participants met the criteria and were enrolled serially as they were obtained from retrospective search from the Hospital records. A sample size was estimated by the Kish Leslie formula (17) using previous prevalence of 35.7% among patients with gastrointestinal (GIT) symptoms in Uganda (13).

### **Data collection procedure**

Participants socio-demographic and clinical characteristics including Age, Sex, Residency, symptoms, duration of illness and *H pylori* SAT results from April to May 2023 were obtained from the clinic information system (*Afya Care System*) and supplemental information were derived from MTUHA books from Doctors consultation rooms and Laboratory registers.

### **Laboratory diagnosis of *H pylori* Infection.**

Generally, *H pylori* infection can be detected by various technics which can be invasive (endoscopy with biopsies for culture and histology) or non-invasive methods (serology, the urea breath test and stool antigen test). However, SAT was used in our study as it detects only active infection and it is more specific than the serology antibody test (18,19).

SAT is immunochromatography technique which detects *H pylori* antigen in human feaces. A stool sample was collected in a sterile container and 50 mg of stool (equivalent to ¼ of a pea) taken from 3 different sites of the sample was mixed with the buffer. For liquid or watery stool specimen, 100µl (approximately two drops) of the sample was taken using a plastic disposable pipette. Then, three to five drops of diluted fecal samples in the buffer solution were introduced into a sample well and kept at room temperature for 15 min. The test results was positive if colored bands appeared at both the control line and test line and negative If only the control line was visible. In both cases, the test was said to be valid if the band appeared on the control line.

### **Data management and analysis**

Data were entered into Microsoft excel and then exported to STATA version 15. The median (IQR) was calculated for continuous variables, whereas proportions, frequency tables, bar and pie charts were used for categorical variables. The prevalence of *H pylori* infection among patients with GIT symptoms was determined by taking those with positive *H pylori* stool antigen test results as the numerator over the total number of enrolled patients as denominator.

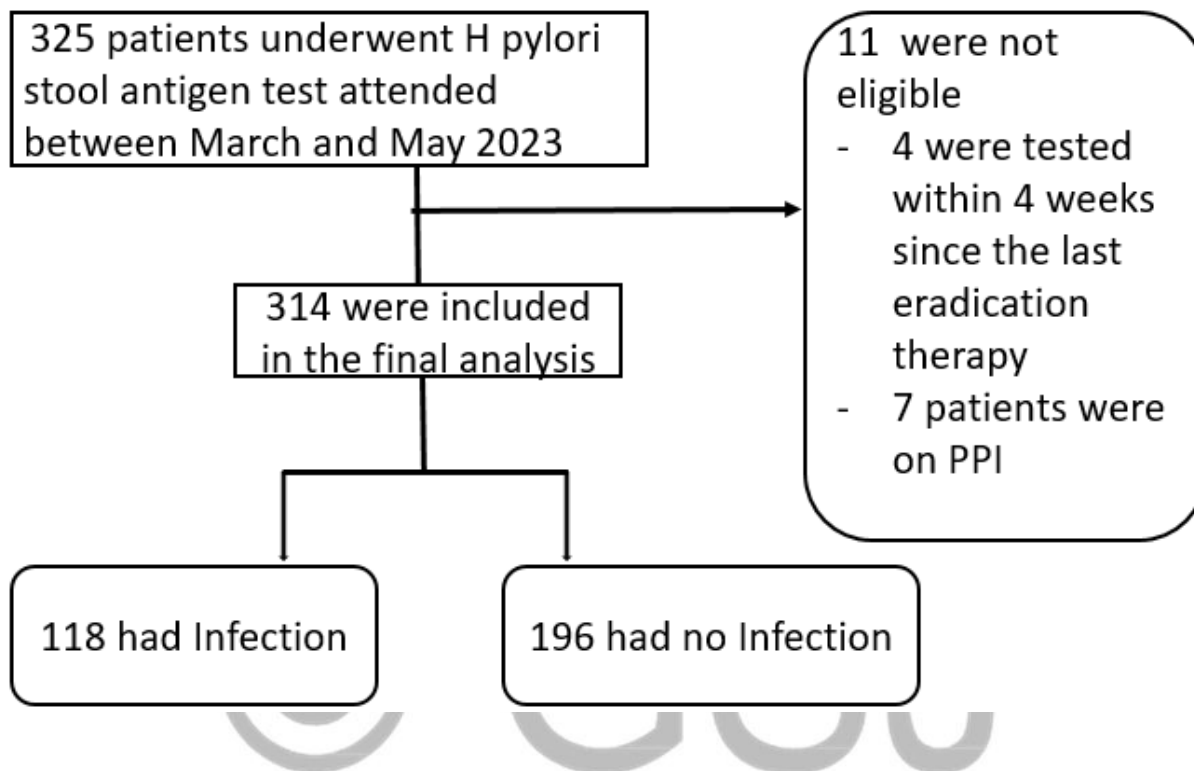
Furthermore, to determine independent factors associated with *H pylori* infection logistic regression was performed and a p-value < 0.05 at 95% confidence interval was considered to constitute statistically significant difference.

## **RESULTS**

### **Study enrolment**

A total of 325 participants who attended Songwe Regional Referral Hospital from April to May 2023 had GIT symptoms and underwent *H pylori* stool Antigen test. Among the tested participants, 11 were not eligible for the enrolment as 4 were tested within 4 weeks after eradication therapy

and 7 were on PPI. The remaining 314 met the inclusion criteria and were enrolled in the study and included in the final analysis (**Figure 1**).



**Figure 1: Study flow diagram**

### **Social demographic characteristics of 314 participants**

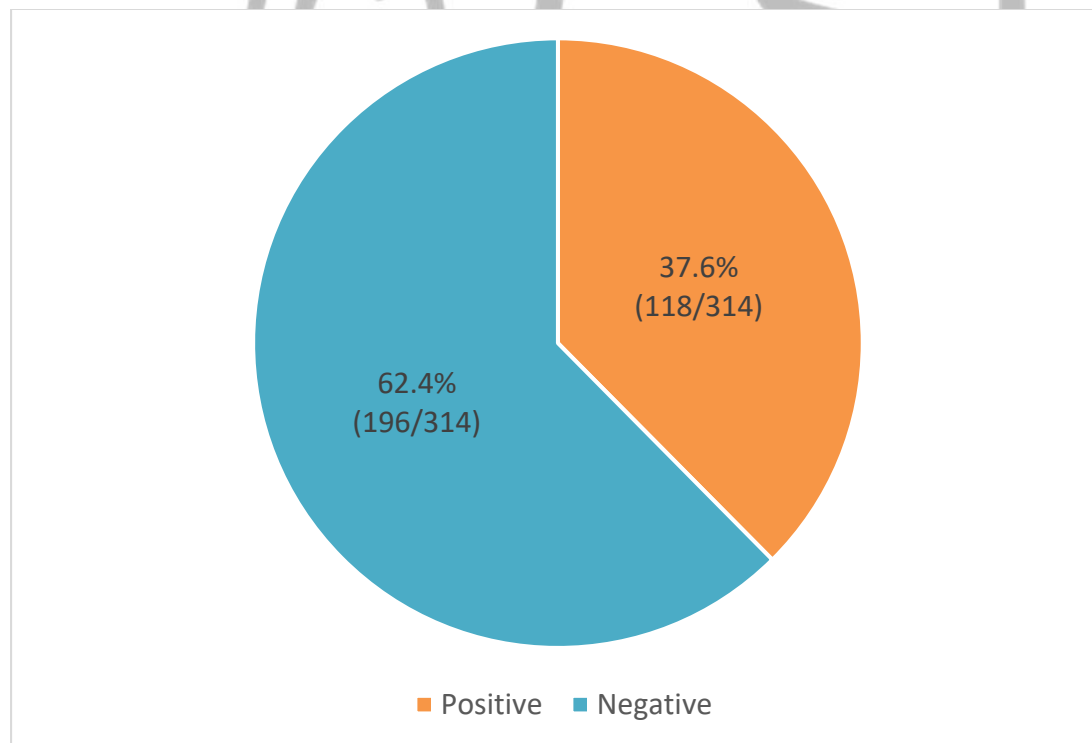
A total of 314 participants were enrolled in this study and included in the final analysis. The participants median age was 36 [23 – 53] years and majority of them 215 (68.5%) were females. About two third 211 (67.4%) were residents of Mbozi district (**Table 1**).

**Table 1: Demographic characteristic among 314 participants with GIT symptoms attended at SRRH from April to May 2023.**

Demographic Characteristics	Number (%) or Median [IQR] N=314
<b>Gender</b>	
Male	99 (31.5)
Female	215 (68.5)
<b>Age (in months)</b>	
	36 [23 – 53]
<b>Residence</b>	
Vwawa	57 (18.2)
Mbozi (out of Vwawa)	154 (49.2)
Out of Mbozi	102 (32.6)

**Prevalence of H pylori infection among 314 participants**

About one third of participants tested positive for H *pylori* stool antigen and hence the prevalence of H *pylori* infection hypernatremia was 37.6% (**Figure 2**).



**Figure 2: Prevalence of H pylori infection among 314 participants with GIT symptoms.**

## Factors associated H pylori infection

No factor was found to be statistically significant associated with *H pylori* infection. However the infection was predominant in males (43.4%) compared to females (34.9%) and in young and middle aged people (15 – 50) years. Participants living in different areas were almost affected by *H pylori* infection in the same way (Table 2).

**Table 2: Factors associated with H pylori infection among 314 participants with GIT symptoms attended at SRRH between April and May 2023**

Variable	H pylori Infection		Univariate	
	Yes (n=118) n (%)	No (n=196) n (%)	OR [95% CI]	p-value
<b>Age (years)</b>				
1 – 15	16 (32.0)	34 (68.0)	1.0	
15 – 35	48 (46.6)	55 (53.4)	1.9 [0.9 – 3.8]	0.088
36 – 50	33 (46.5)	38 (53.5)	1.8 [0.7 – 3.9]	0.112
>50	21 (23.3)	69 (76.7)	0.6 [0.3 – 1.4]	0.267
<b>Gender</b>				
Female	75 (34.9)	140 (65.1)	1.0	
Male	43(43.4)	56 (56.6)	1.4 [0.9 – 2.3]	0.147
<b>Residency</b>				
Vwawa	21 (36.8)	36 (63.2)	1.0	
Mbozi (out of vwawa)	61(39.6)	93 (60.4)	1.1 [0.6 – 2.1]	0.714
Out of Mbozi	36 (35.3)	66 (64.7)	0.9 [0.5 – 1.8]	0.845

## DISCUSSION

*H pylori* has been associated with peptic ulcer disease and gastric cancer and WHO has declared it as group I carcinogen (10). Understanding the magnitude and factors associated with this infection is the golden key towards proper management of these patients and can help to avoid unnecessary investigations and costs. Our study aimed at determining the prevalence and factors associated with *H pylori* infection among patients with GIT symptoms attended at Songwe Regional Referral Hospital.

In this study, about one third of symptomatic patients had *H pylori* infection confirmed by *H pylori* stool antigen test. Hence, the prevalence of *H pylori* infection in our study was found to be 37.6%.

The prevalence of *H pylori* infection in our study was similar to that obtained by Namyalo et al who reported the prevalence of 35.7% (13). This similarity can probably be explained by similar study design and setting as well as the fact that, in both studies all participants who had GIT symptoms and underwent *H pylori* stool antigen test were included despite their age.

On the other hand, the prevalence of *H pylori* infection in our study was higher as compared to the study done at KCMC where the prevalence was found to be 11.5%. This can be explained by the difference in study population and type of *H pylori* test used (15). The study done at KCMC included only children from 6 months to 14 years old and used serology test whereas we included all symptomatic patients regardless their age and we used SAT.

Moreover, the prevalence of *H pylori* in this study was lower than that obtained by Jaka et al which was 60.3%. This difference can be due to different study population and study design as they included adult population and it was a prospective cross sectional study (2).

Similarly to Namyalo et al, the prevalence of *H pylori* infection in the current study was higher in males compared to females, though this was not statistically significant in both studies. However, in the meta-analysis of large population based studies by de Martel et al, the male gender was found to be significantly associated with *H pylori* infection (20). These findings may explain the male predominance in most *H pylori* related diseases.

Moreover, *H pylori* infection was more prevalent in middle aged participants (15 – 50 years) in our study, though this was not statistically significant. However, similar findings were obtained in Zimbabwe, Iraq and Norway were statistically significant, probably due to larger sample size (21–23). The higher prevalence among middle aged individuals may probably be explained by increased level of stress and anxiety at this stage of life attributed by financial and family

responsibilities. In the study by Kabeer *et al*, stress and anxiety were found to be associated with *H pylori* infection (24).

Our study was limited by presence of incomplete patient's information from the Hospital health system which made us to study only few factors.

## CONCLUSION

About one third of participants with GIT symptoms attended at SRRH from April to May 2023 had *H pylori* infection. The infection was predominant in male and middle aged (15 – 50 years) participants, nevertheless this was not statistically significant. Clinicians should increase their index of suspicion for possibility of *H pylori* infection as an important cause of GIT symptoms among patients attending SRRH.



## RECOMMENDATIONS

Clinicians should consider investigating for *H pylori* infection in patients with GIT symptoms. However, other prospective studies should be done at SRRH to determine factors associated with *H pylori* infection in order to facilitate rational investigations and avoid unnecessary costs.

## LIST OF ABBREVIATIONS

GIT	Gastro-Intestinal Tract
<i>H pylori</i>	<i>Helicobacter pylori</i>
IARC	International Agency for Research on Cancer
KCMC	Kilimanjaro Catholic Medical Centre
MALT	Mucosal Associates Lymphoid Tissue

PPI	Proton Pump Inhibitor
PUD	Peptic Ulcer Disease
SAT	Stool Antigen Test
SRRH	Songwe Regional Referral Hospital
WHO	World Health Organization

### **Availability of data and material**

All data generated/analyzed during this study are included in this manuscript.

### **Competing interest**

The authors do not have competing interest

### **Funding**

Songwe regional referral hospital (SRRH).

### **Authors' contribution**

Conceived and designed the study: JR, MG, JB and FM. Data collection MG, SM, JB and FM. Analyzed the data: JR, MG, FM and JB. Wrote the paper: JR and MG. All authors read and approved the final manuscript

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### **REFERENCES**

1. Tanih NF, Dube C, Green E, Mkwetshana N, Clarke AM, Ndip LM, et al. An African perspective on Helicobacter pylori: Prevalence of human infection, drug resistance, and alternative approaches to treatment. *Ann Trop Med Parasitol*. 2009;103(3):189–204.
2. Jaka H, Mueller A, E Mshana S, Kasang C. Prevalence and factors associated with active

- H. pylori infection among the asymptomatic population and dyspeptic patients in Mwanza North-western Tanzania. *Acta Sci Gastrointest Disord.* 2022;5(6):25–33.
3. Kusters JG, Van Vliet AHM, Kuipers EJ. Pathogenesis of *Helicobacter pylori* infection. *Clin Microbiol Rev.* 2006;19(3):449–90.
  4. Sipponen P, Hyvärinen H. Role of *Helicobacter pylori* in the pathogenesis of gastritis, peptic ulcer and gastric cancer. *Scand J Gastroenterol.* 1993;28(S196):3–6.
  5. Bashir SK, Khan MB. Overview of *Helicobacter pylori* Infection, Prevalence, Risk Factors, and Its Prevention. *Adv Gut Microbiome Res.* 2023;2023:1–9.
  6. Cave DR, Go M, Cutler A, Goldstein J, Dunn B, Mobley H, et al. Transmission and epidemiology of *Helicobacter pylori*. *Am J Med.* 1996;100(5 A):12S-18S.
  7. Jaka H, Mushi MF, Mirambo MM, Wilson L, Seni J, Mtebe M, et al. Sero-prevalence and associated factors of *Helicobacter pylori* infection among adult patients with dyspepsia attending the gastroenterology unit in a tertiary hospital in Mwanza, Tanzania. *Afr Health Sci.* 2016;16(3):684–9.
  8. Xu CD, Chen SN, Jiang SH, Xu JY. Seroepidemiology of *Helicobacter pylori* infection among asymptomatic Chinese children. *World J Gastroenterol.* 2000;6(5):759–61.
  9. Lee YY, Ismail AW, Mustaffa N, Musa KI, Majid NA, Choo KE, et al. Sociocultural and Dietary Practices Among Malay Subjects in the North-Eastern Region of Peninsular Malaysia: A Region of Low Prevalence of *Helicobacter pylori* Infection. *Helicobacter.* 2012;17(1):54–61.
  10. Hunt RH, France FM. *Helicobacter Pylori* in Developing Countries. *World. J Gastrointest Liver Dis.* 2011;20(3):299–304.
  11. Ozaydin N, Turkyilmaz SA, Cali S. Prevalence and risk factors of *Helicobacter pylori* in Turkey: A nationally-representative, cross-sectional, screening with the 13C-Urea breath test. *BMC Public Health.* 2013;13(1).
  12. Xu C, Yan M, Sun Y, Joo J, Wan X, Yu C, et al. Prevalence of *Helicobacter pylori* infection and its relation with body mass index in a Chinese population. *Helicobacter.* 2014;19(6):437–42.
  13. Namyalo E, Nyakarahuka L, Afayoa M, Baziira J, Tamale A, Atuhaire GC, et al.

- Prevalence of *Helicobacter pylori* among Patients with Gastrointestinal Tract (GIT) Symptoms: A Retrospective Study at Selected Africa Air Rescue (AAR) Clinics in Kampala, Uganda, from 2015 to 2019. *J Trop Med*. 2021;2021.
14. Kimang'a AN, Revathi G, Kariuki S, Sayed S, Devani S. *Helicobacter pylori*: Prevalence and antibiotic susceptibility among Kenyans. *South African Med J*. 2010;100(1):53–7.
  15. Msekandiana A, Msuya L, Philemon R, Blandina M, Kinabo G. infection amongst children receiving care at Kilimanjaro Christian Medical Center. 2019;19(4):3208–16.
  16. Wroblewski LE, Peek RM, Wilson KT. *Helicobacter pylori* and gastric cancer: Factors that modulate disease risk. *Clin Microbiol Rev*. 2010;23(4):713–39.
  17. Leslie Kish JW. survey sampling. *Am Polit Sci Rev*. 1965;59(4):643.
  18. Kouitcheu Mabeku LB, Bello Epesse M, Fotsing S, Kamgang R, Tchidjo M. Stool Antigen Testing, a Reliable Noninvasive Method of Assessment of *Helicobacter pylori* Infection Among Patients with Gastro-duodenal Disorders in Cameroon. *Dig Dis Sci*. 2021;66(2):511–20.
  19. Khalifehgholi M, Shamsipour F, Ajhdarkosh H, Daryani NE, Reza Pourmand M, Hosseini M, et al. Comparison of five diagnostic methods for *Helicobacter pylori*. *Iran J Microbiol*. 2013;5(4):396–401.
  20. De Martel C, Parsonnet J. *Helicobacter pylori* infection and gender: A meta-analysis of population-based prevalence surveys. *Dig Dis Sci*. 2006;51(12):2292–301.
  21. Raheem Al-Ardawi EJ, Al-Hussaini RM, Kadhim Al-Asady HM, Sahib AA, Tizkam HH. Prevalence and association of *Helicobacter pylori* infection with gastritis and its age and sex distribution in a population of Karbala. *Drug Invent Today*. 2019;(11):2571–4.
  22. Breckan RK, Paulssen EJ, Asfeldt AM, Kvamme JM, Straume B, Florholmen J. The All-Age Prevalence of *Helicobacter pylori* Infection and Potential Transmission Routes. A Population-Based Study. *Helicobacter*. 2016;21(6):586–95.
  23. Mungazi SG, Chihaka OB, Muguti GI. Prevalence of *Helicobacter pylori* in asymptomatic patients at surgical outpatient department: Harare hospitals. *Ann Med Surg*. 2018;35(February):153–7.
  24. Kabeer KK, Ananthakrishnan N, Anand C, Balasundaram S. Prevalence of *Helicobacter*

Pylori infection and stress, anxiety or depression in functional dyspepsia and outcome after appropriate intervention. *J Clin Diagnostic Res.* 2017;11(8):VC11–5.

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